10/678363

Patent No. 6,911,742
Request for Cert. of Correction dated November 10, 2005
Attorney Docket No. 3419-031894

COPY

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent No.	:	6,911,742	Confirmation No. 7086
Inventors	:	Gupta et al.	
Issued	:	June 28, 2005	
Title	:	Method And Apparatus For Turbine/Alternator On Common Shaft During Start-Up	
Examiner	:	Nicholas Ponomarenko	
Customer No.	:	28289	

REQUEST FOR CERTIFICATE OF CORRECTION OF PATENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

ATTENTION: Decision and Certificate of Correction
Branch of the Patent Issue Division

Sir:

In accordance with 35 U.S.C. §255, we attach hereto Form PTO/SB/44 and proof of errors and request that a Certificate of Correction be issued in the above-identified patent. The following errors appear in the patent as printed:

Column 8, Line 38, Claim 4, "form said position" should read -- from said position --
(See application as filed, page 11, Claim 4, line 2.)

Column 9, Line 6, Claim 15, "an inverter provide" should read -- an inverter provided --
(See application as filed, page 12, Claim 15, line 3.)

Column 9, Line 26, Claim 18, "form said position" should read -- from said position --
(See application as filed, page 13, Claim 18, line 2.)

Column 10, Line 12, Claim 24, "an said turbine/alternator" should read
-- said turbine/alternator --
(See application as filed, page 13, Claim 24, line 2.)

Column 10, Line 27, Claim 29, "said means to provide" should read
-- said means provides --
(See application as filed, page 14, Claim 29, line 2.)

The above errors are obvious typographical errors made by Applicants. A check for $100.00 is attached to cover the fee for correction of Applicants' mistakes.

Respectfully submitted,

THE WEBB LAW FIRM

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(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.	:	6,911,742
APPLICATION NO.	:	10/678,363
ISSUE DATE	:	June 28, 2005
INVENTORS	:	Gupta et al.

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 8, Line 38, Claim 4, "form said position" should read -- from said position --

Column 9, Line 6, Claim 15, "an inverter provide" should read -- an inverter provided --

Column 9, Line 26, Claim 18, "form said position" should read -- from said position --

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-- said turbine/alternator --

Column 10, Line 27, Claim 29, "said means to provide" should read
-- said means provides --

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METHOD AND APPARATUS FOR TURBINE/ALTERNATOR ON COMMON SHAFT DURING START-UP

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is division of United States Patent Application No. 10/446,386 filed May 28, 2003 which is a continuation of United States Patent Application No. 09/840,572, filed April 23, 2001, which is a continuation of United States Application No. 09/319,390, filed June 1, 1999, which is the United States national phase of International Application No. PCT/US97/22405, filed December 3, 1997 which designated, *inter alia*, the United States, and which claims the benefit of United States Provisional Application No. 60/032,149, filed December 3, 1996.

BACKGROUND OF THE INVENTION

[0002] Gas turbines must be driven to rotate at a starting speed by auxiliary means prior to fuel injection and ignition and self-sustained operation. In the past, for example, gear box systems driven by auxiliary electric or compressed air motors have been used to rotate the turbine to starting speed. "Air" impingement starting systems have also been used with small turbines and operated by directing a stream of gas, typically air, onto the turbine or compressor wheel to cause rotation of the main rotor. These prior art systems are complex and difficult to implement.

[0003] Electrical power may be generated by using a gas turbine to drive an alternator. The alternator may be driven by a free turbine which is coupled to the rotor of the alternator or through a gear box. In these systems, the speed of the turbine must be precisely controlled to maintain the desired frequency and voltage of the alternating current output.

SUMMARY OF THE INVENTION

[0004] In accordance with the present invention, an alternator having a permanent magnet rotor is connected to the main turbine rotor making possible both starting of the turbine as well as generation of electrical power. The electrical system described herein allows the rotor to operate at various speeds with an output frequency and voltage unrelated to rotor speed. The electrical system incorporates a unique inverter which yields the appropriate voltage and frequency in both the start-up mode of operation as well as in the power generation mode of operation.

[0005] The electrical system is used to cause rotation of the turbine during the start-up mode and subsequently is used to extract electrical power from the alternator after the turbine has reached its normal operating conditions. At start-up, the alternator functions as an electric motor.

WHAT IS CLAIMED:

1. A method of controlling a turbine/alternator comprising a gas driven turbine and permanent magnet alternator on a common shaft comprising:

providing electric power to said turbine/alternator through an inverter circuit to start said turbine/alternator to achieve self-sustained operation of said turbine/alternator;

reconfiguring said inverter circuit to output electric power from said turbine/alternator when self-sustained operation of said turbine/alternator is achieved; and

providing electric power to said turbine/alternator controlling frequency and voltage of the electric power as a function of time.

2. The method of claim 1, wherein controlling the frequency and voltage of the electric power is performed as a function of time and rotation speed of said turbine/alternator.

3. The method of claim 1, wherein during providing electric power to said turbine/alternator, shaft position changes of said turbine/alternator are sensed by a position encoder.

4. The method of claim 3, wherein a signal generator processes the output information form said position encoder to output at a frequency which is a function of engine speed of said turbine/alternator.

5. The method of claim 3, wherein a signal from the position encoder is used to control the inverter.

6. The method of claim 4, wherein said inverter circuit comprises an inverter, and the output frequency from the signal generator is used to control the frequency of the inverter output voltage.

7. The method of claim 3, wherein said position encoder comprises a shaft position sensor.

8. The method of claim 7, wherein said shaft position sensor is a Hall effect sensor.

9. The method of claim 8, wherein said inverter circuit is controlled to generate a three-phase output to ramp said turbine/alternator to an ignition speed.

10. The method of claim 7 further comprising phasing the shaft position sensor by causing of said turbine/alternator having an armature to rotate at least once.

11. The method of claim 10, wherein said shaft position sensor is a Hall effect sensor.

12. The method of claim 1, wherein during providing electric power to said turbine/alternator, controlled combustion of fuel and air is provided to said gas driven turbine of said turbine/alternator.

13. The method of claim 1, wherein when reconfiguring said inverter circuit, said inverter circuit is connected to said turbine/alternator through a rectifier.

14. The method of claim 1, wherein said inverter circuit comprises an output filter for filtering said electric power, and said output filter is removed when providing electric power to said turbine/alternator through said inverter circuit.

15. An electric system for a turbine/alternator comprising gas driven turbine and permanent magnet alternator on a common shaft comprising:

an inverter provide for operation of said turbine/alternator;

means to provide electric power to said turbine/alternator through said inverter to start said turbine to achieve self-sustained operation of said turbine/alternator;

means to reconfigure said inverter to output electric power from said permanent magnet turbine/alternator to supply the electric power to a load,

wherein the frequency and voltage of the electric power provided to said turbine/alternator is controlled as a function of time to start said turbine/alternator.

16. The electric system of claim 15, wherein frequency and voltage of the electric power provided to said turbine/alternator is controlled as a function of time and rotation speed of said turbine/alternator.

17. The electric system of claim 16, wherein a position encoder is provided to said turbine/alternator for sensing shaft position changes of said turbine/alternator.

18. The electric system of claim 17, wherein a signal generator processes output information form said position encoder to output at a frequency as a function of engine speed of said turbine/alternator.

19. The electric system of claim 17, wherein a signal from the position encoder is used to control said inverter.

20. The electric system of claim 19, wherein the variable frequency output from the signal generator is used to control the frequency of the inverter output voltage.

21. The electric system of claim 17, wherein said position encoder comprises a shaft position encoder.

22. The electric system of claim 21, wherein said shaft position sensor is a Hall effect sensor.

23. The electric system of claim 22, wherein said inverter circuit is controlled to generate a three-phase output to ramp said turbine/alternator to an ignition speed.

24. The electric system of claim 21, further comprising phasing the shaft position sensor by causing an said turbine/alternator having an armature to rotate at least once.

25. The electric system of claim 24, wherein said shaft position sensor is a Hall effect sensor.

26. The electric system of claim 25, further comprising means to provide controlled combustion of fuel and air to said gas driven turbine to achieve self-sustained operation of said gas driven turbine.

27. The electric system of claim 25, wherein said means to reconfigure said inverter connects said inverter to said turbine/alternator through a rectifier.

28. The electric system of claim 25, wherein said load comprises a power line, and said means to reconfigure said inverter supplies electric power to said power line at a common line voltage and frequency.

29. The electric system of claim 25, further comprising an output filter for filtering said electric power, which output filter is removable when said means to provide electric power to said turbine/alternator.